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EXAMINER

JACOB, OOMMEN

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/593,848	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	OOMMEN JACOB	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to Claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 2-16, 18, 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.**

Applicant has amended independent Claims such that they are directed to claim the embodiment of Fig 5 (*Fig 5 is the only embodiment with three remote nodes connected sequentially*).

Claim 2 recite "...the first remote distribution node includes a series of band splitting filters..." Fig 5 only shows one add and one drop filter. A "series of band splitting filters" is used in Fig 2 which is a different network configuration.

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Claims 4, 5, 9-13 and 15-16 recites "multiplexer/demultiplexer" in either the first, second or both remote nodes. Embodiment of Fig 5 does not have such devices in either first or second node. They only have add/drop filters. The claimed multiplexer/demultiplexer are only used in other network configurations by applicant (*Fig 1-4*).

Claims 6-10, 18 and 21 claims splitting of optical signals into odd and even channels. The splitting of first composite signal into odd and even channels is done in a different network configuration of Fig 3.

Hence the amendments to independent Claim creates new matter situation for dependent Claims as discussed above.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**3. Claims 1, 4-5, 11-12, 14-17, 19-20, 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Song [US PUB NO: 2004/0033076] in view of Saleh [US PAT NO: 6512614].**

As per Claims 1, 17 and 20

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Song teaches a wavelength division multiplexing passive optical network (WDM-PON) for performing bi-directional communication (*Song Fig 8*), the WDM-PON comprising:

at least three remote distribution nodes between a central office and a first optical network unit including a first remote distribution node, a second remote distribution node, and a third remote distribution node, each of the first remote distribution node and the second remote distribution node is located in a physically separate location (*Song Fig 8 items RN1, RN2, RNn are remote nodes in physically separate locations*),

wherein the first remote distribution node, the second remote distribution node, and the third remote distribution node are connected to each other sequentially (*Song Fig 8 shows sequential arrangement of nodes*),

wherein the first remote distribution node includes at least one band splitting filter configured to couple a first composite optical signal and a second composite optical signal to a first optical cable connected to the central office (*Song Fig 8, ¶0095 discloses bidirectional traffic from CO to remote nodes. This implies that RN1 couples downstream (first composite signal) and upstream (second composite signal) to the CO. ¶0096 further discloses add/drop device in remote nodes for band-splitting wavelengths. ¶0092 discloses this as thin filter*), wherein the first composite signal travels on the first optical cable in a first direction (*Song Fig 8 downstream is first direction*), and the second composite optical signal travels on the first optical cable in a second direction opposite the first direction (*Song Fig 8 upstream is second direction*), and configured to connect to the second remote distribution node (*Song Fig 8 RN1 is configured to connect to RN2 via fiber*),

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wherein each of the first remote distribution node and the second remote distribution node are configured to separate at least one wavelength channel from the first composite optical signal distributed through that remote distribution node (*Song Fig 8 , ¶0096 discloses add/drop device in remote nodes for dropping from the downstream signal, wavelengths corresponding to the particular subscriber*).

The only difference between Song and the instant Claim is that Song does not teach that the second distribution node is coupled to at least two optical network units.

Saleh teaches a second distribution (remote) node coupled to at least two optical network units (*Saleh Fig 6 item 606L is a second distribution node coupled to two customer units 604O and 604N*).

Hence it is known from Saleh that more than one customer can be connected to a remote distribution node. At the time of invention it would have been obvious to a person of ordinary skill in the art to modify the apparatus in Song by integrating method for connecting more than one customer units to a remote node. The motivation would have been to increase number of users that have access to the network.

#### As per Claims 4

Song in view of Saleh teaches Claim 1 as discussed above.

Song in view of Saleh further teaches wherein the second remote distribution node contains includes a first multiplexer/demultiplexer and to receive a first subset of the wavelength channels in the first composite optical signal from the first remote distribution node and to send a first portion of wavelength channels in the second composite optical signal to the first remote distribution node (*In view of 112 rejection above, examiner interprets add/drop filter 501/502 of*

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*applicant Fig 5 to perform claimed functions. Song ¶0092, ¶0096 discloses add/drop devices using filters), wherein the second composite optical signal occupies a different wavelength band than the first composite optical signal (Song ¶0101 discloses use of different wavelengths for forward and backward channels in conventional WDM PON although at the cost of additional MUX/DEMUX).*

As per Claim 5

Song in view of Saleh teaches Claim 4 as discussed above.

Song in view of Saleh further teaches wherein the second remote distribution node also contains includes a second multiplexer/demultiplexer to receive a second subset of the wavelength channels in the first composite optical signal from the first remote distribution node and to send a second subset of wavelength channels from the second wavelength band to the first remote distribution node (*In view of 112 above, Saleh Fig 6 item 606L contains a second MUX/DEMUX).*

As per Claim 11

Song in view of Saleh teaches Claim 1 as discussed above.

Song in view of Saleh further teaches wherein the first remote distribution node has a multiplexer/demultiplexer coupled to at least two or more band splitting filters configured to split the first composite optical signal that includes all of the wavelength channels in a first wavelength band into a first subset of wavelength channels and a second subset of wavelength channels (*In view of 112 rejection above, Song Fig 8, add/drop device of RN1 splits first composite signal into a first wavelength  $\lambda_1$  and remaining wavelengths as second subset ).*

As per Claim 12

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Song in view of Saleh teaches Claim 11 as discussed above.

Song in view of Saleh further teaches wherein the second remote distribution node contains includes a first multiplexer/demultiplexer to receive the first subset of wavelength channels from the first remote distribution node, a second multiplexer/demultiplexer to receive the second subset of wavelength channels from the first remote distribution node (*In view of 112 rejections above, second remote node of Saleh Fig 6 receives two subsets of wavelengths from first remote node  $\lambda_2$ ,  $\lambda_7$* ).

As per Claim 14

Song in view of Saleh teaches Claim 11 as discussed above.

Song in view of Saleh further teaches wherein the at least one band splitting filter is further configured to separate the first composite optical signal and the second composite optical signal (*In view of 112 rejection above Song ¶0092 discloses thin film filter as add/drop device*).

As per Claim 15

Song in view of Saleh teaches Claim 1 as discussed above.

Song in view of Saleh further teaches wherein the first remote distribution node includes a first multiplexer/demultiplexer and a second remote distribution node includes an add drop module, wherein a first drop module is configured to remove a wavelength channel from the first composite optical signal that includes all of the wavelength channels and the first multiplexer/demultiplexer s is configured distribute at least two or more of the wavelength channels in the first composite optical signal (*In view of 112 rejection above, Song Fig 8 RN1 and RN2 contains add/drop device that that removes one wavelength each and distributes remaining wavelengths to the further downstream nodes*).



As per Claim 16

Song in view of Saleh teaches Claim 1 as discussed above.

Song in view of Saleh further teaches comprising: at least two or more add/drop modules coupled to the first optical cable from the central office to the first remote distribution node containing a first multiplexer/demultiplexer, wherein the add/drop modules to remove wavelength channels from the first composite optical signal prior to the first multiplexer/demultiplexer (*In view of 112 rejections above, Song Fig 8, remote nodes contains add/drop devices for removing one wavelength each from first composite signal*).

As per Claims 19 and 22

Song in view of Saleh teaches Claims 17 and 20 as discussed above.

Song in view of Saleh further teaches combining at least two optical signals in a second wavelength band along the transmission path (*Song Fig 8, wavelengths added to remote node is different from other wavelengths coming upstream*), each signal with at least one wavelength channel, wherein the second composite optical signal travels in an opposite direction of first composite signal and occupies a different wavelength band than the optical composite optical signal (*Song ¶0101discloses conventional use of different bands at additional costs*).

**4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song in view of Saleh as applied to Claim 1 above and further in view of Liu [US PUB NO: 2001/0038479].**

As per Claim 2

Song in view of Saleh teaches Claim 1 as discussed above.

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Song in view of Saleh does not expressly teach wherein the first remote distribution node having has a series of band splitting filters configured to split the first composite optical signal that includes all of the wavelength channels in a first wavelength band into a first subset of the wavelength channels and a second subset of the wavelength channels.

Liu teaches band splitting using a series of band splitting filters (*Liu Fig 1 discloses two stages of band splitting filters based. More stages can be added based on groups and channel assignment for groups*).

Song in view of Saleh discloses the claimed invention except that they use one filter (*Song ¶0092*) instead of a series of band splitting filters. At the time of invention it would have been obvious to a person of ordinary skill to modify Song in view of Saleh by integrating arrangement as in Liu. The motivation would have been to implement the add/drop device for more than one wavelengths.

### As per Claim 3

Song in view of Saleh and Liu teaches Claim 2 as discussed above.

Song in view of Saleh and Liu further teaches wherein the series of band splitting filters are also coupled together to create a second composite optical signal in a second wavelength band by combining a first portion of the wavelength channels in the second wavelength band and a second portion of the wavelength channels in the second wavelength band, wherein the second composite optical signal travels in the opposite direction of the first composite optical signal (*Liu teaches that the series of filters can be used for multiplexing/combining wavelengths. Liu Fig 7 multiplexing is form left to right direction*) and occupies a different wavelength band than the

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first composite optical signal (*Song ¶0101 discloses conventional use of different bands at additional costs*).

**5. Claims 6-10, 8, 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song in view of Saleh as applied to Claims 1, 17 and 20 above, and further in view of Tervonen [WO 03/055111]**

As per Claim 8

Song in view of Saleh teaches Claim 1 as discussed above.

Song in view of Saleh does not expressly teach wherein the first direction is a downstream direction from the central office, and the second direction is upstream direction to the central office, and wherein the first remote distribution node includes an optical interleaver to receiving receive the first composite optical signal that travels in the downstream direction from the central office, divides the downstream first composite optical signal into odd wavelength channel signals and even wavelength channel signals in order to output the odd and even wavelength signals to corresponding multiplexer/demultiplexers, and receives the odd and even wavelength channel signals from the corresponding multiplexer/demultiplexers in order to combine the odd wavelength channel signals with the even wavelength channel signals.

Tervonen in teaches wherein a first remote distribution node includes an optical interleaver to receiving a downstream optical signal from the central office (*Tervonen Fig 5 item 512*), divides the downstream signal into odd wavelength channel signals and even wavelength channel signals in order to output the odd and even wavelength signals to corresponding multiplexer/demultiplexers (*Tervonen Fig 5 item 512 transmits odd channels to 511 and even to*

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513), and receives the odd and even wavelength channel signals from the corresponding multiplexer/demultiplexers in order to combine the odd wavelength channel signals with the even wavelength channel signals (*Tervonen Fig 5 item 512 receives and combines odd channels and even channels from 513 and 511 respectively*).

Song in view of Saleh uses filter for MUX/DEMUX. Tervonen shows an interleaver for separating and combining (MUX/DEMUX) wavelengths, and is an equivalent structure known in the art. Therefore, because these devices were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute the one for the other.

As per Claims 6-7, 18 and 21

Claims 6-7, 18 and 21 have limitations similar to Claim 8 and are rejected for same reasons as cited above.

As per Claim 9

Song in view of Saleh and Tervonen teaches Claim 6 as discussed above.

Song in view of Saleh and Tervonen further teaches a second remote distribution node containing a first multiplexer/demultiplexer to receive the odd numbered wavelength channels from the first remote distribution node (*Tervonen Fig 5 item 511 receives odd numbered wavelengths from item 521*) and to send the first portion of the wavelength channels in a second wavelength band to the first remote distribution node (*Tervonen Fig 5 item 511 sends wavelengths  $\lambda_2$  and  $\lambda_4$  to the first distribution node. This is the first portion of channels in a second wavelength band  $\lambda_1$ - $\lambda_4$* ).

As per Claim 10

Song in view of Saleh and Tervonen teaches Claim 9 as discussed above.

Song in view of Saleh and Tervonen further teaches wherein the second remote distribution node also containing a second multiplexer/demultiplexer to receive the even numbered wavelength channels of the first wavelength band from the first remote distribution node (*Tervonen Fig 5 item 511 receives odd numbered wavelengths from item 521*) and to send a portion of the second wavelength band to the first remote distribution node (*Tervonen Fig 5 item 513 sends wavelengths  $\lambda 1$  and  $\lambda 3$  to the first distribution node. This is the second portion of channels in a second wavelength band  $\lambda 1 - \lambda 4$ .*

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to OOMMEN JACOB whose telephone number is (571)270-5166.

The examiner can normally be reached on Monday - Friday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, KENNETH VANDERPUYE can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/O. J./

Acting Examiner of Art Unit 2613

/Shi K. Li/

Primary Examiner, Art Unit 2613